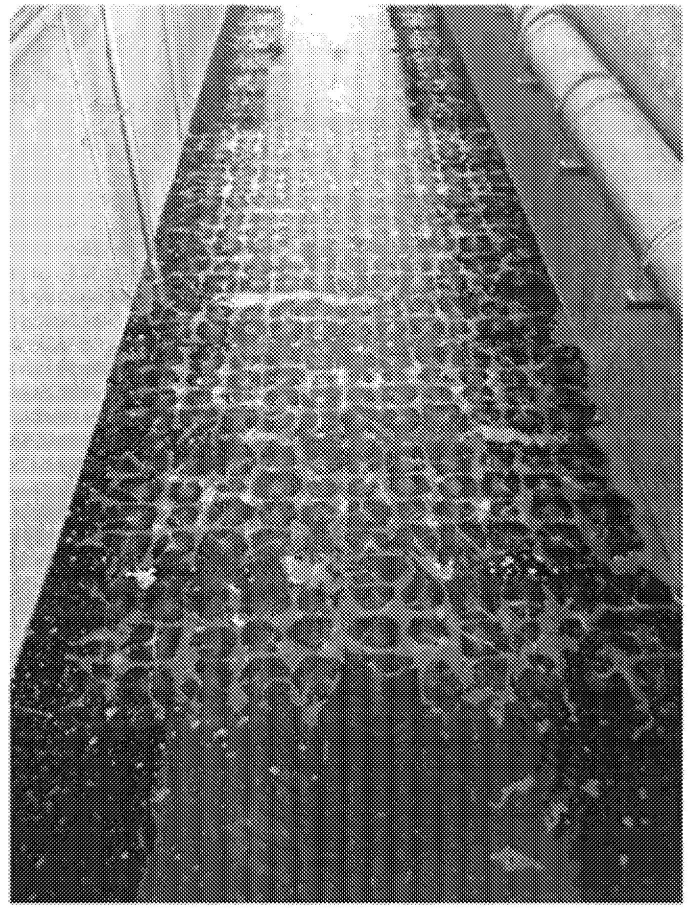
TIJUANA RIVER DIVERSION STUDY

Flow Analysis, Infrastructure Assessment and Development of Alternatives – 30% Progress Meeting | August 28, 2018

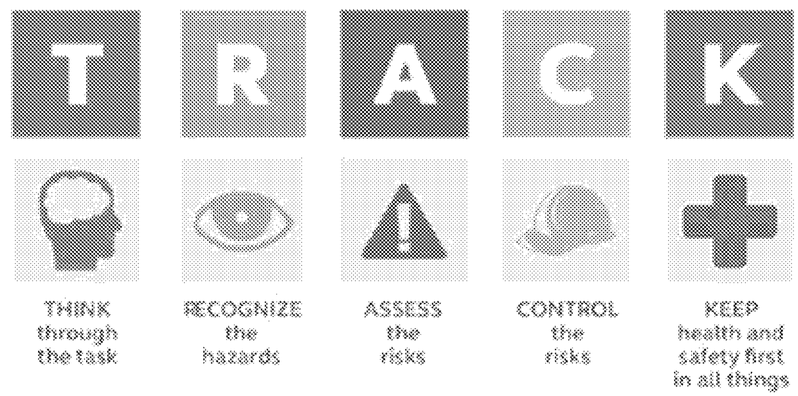
Outline

- H&S Moment
- Project Background and Objectives
- Task 1 – Flow Analysis
- Task 2 – Infrastructure and Operations Diagnostic
- Task 3 – Alternatives Analysis
- Project Schedule
- Next Steps
- Questions/Discussion



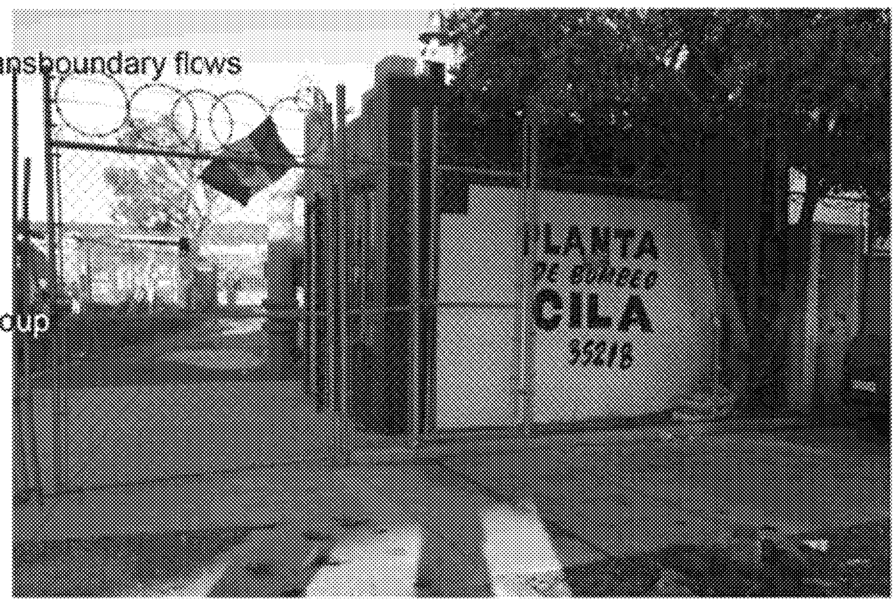
Health and Safety Moment: 6 Fundamental Health & Safety Principles

- Undertake Health and Safety Planning
- Demonstrate H&S Stewardship Daily
- Practice if not me, then who
- Exercise Stop Work Authority
- Report Near Misses and Incidents
- Use TRACK every day



Project Objectives

- Task 1 – Review of Existing Information and Transboundary Flow Analysis
  - Identify previous problems and solutions from completed studies
  - Collect and analyze data on Tijuana River flows, border flows, water quality, beach closure reports, rainfall events
- Task 2 – Infrastructure and Operations Diagnostic
  - Determine infrastructure current capacities and conditions
  - Condition and Operational diagnostics, identify failures resulting in transboundary flows
  - Impact of unserved areas in Tijuana
- Task 3 – Alternatives Analysis
  - Alternative evaluation of 15 total alternatives
  - Provide decision matrix for alternative selection by Binational Core Group
- Task 4 – PM & Stakeholder Coordination
  - Meetings, stakeholder interviews, draft and final reporting



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Task 1 – Transboundary flow analysis scope

1) Compilation and review of existing studies and data identified in the Request for Proposals (RFP)
2) Statistical analysis of transboundary flow data and development of flow-frequency and flow-duration relationships
3) Estimation of annual probability and duration of transboundary flows under low-flow (under 1,000 lps) and higher-flow conditions (up to 3,000 lps) due to operational failure or non-operation of the PB-CILA facility
4) Derivation of relationships between transboundary flows, precipitation, beach closures, and diversion operational failures
5) Estimation of number of undocumented PB-CILA operational failures based on responses to questionnaires designed to elicit relevant information from system operators and appropriate USEPA, USIBWC, CILA, CONAGUA, and CESPT staff (County of San Diego questionnaire responses provided in Appendix A of 30% report)
6) Derivation of distributions of causes of failure and annual probabilities of failure by cause and by flow rate

Task 1 – Study reports and data collection

Study reports:

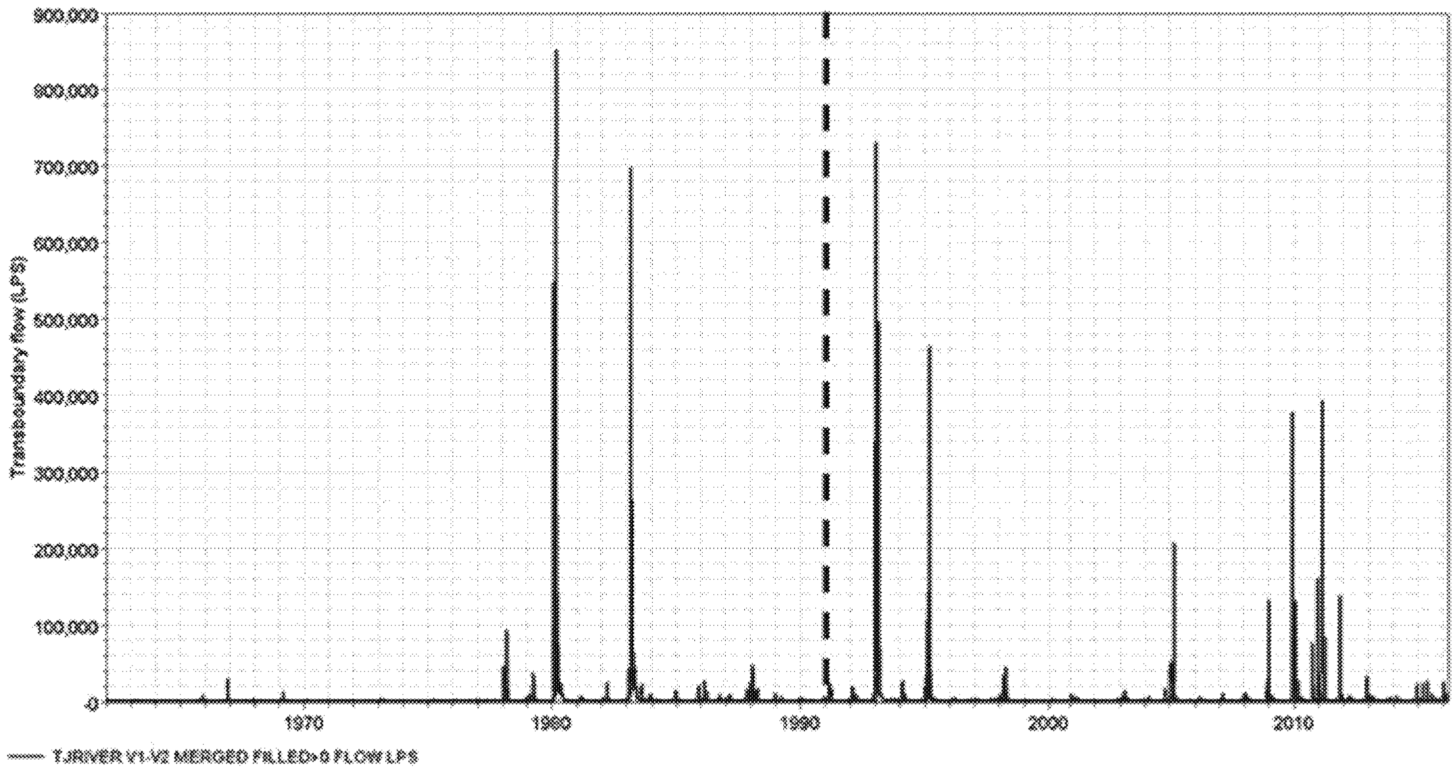
1) CESPT (2017). *Plan for a Comprehensive Wastewater Treatment and Reuse System for the City of Tijuana*.
2) IBWC (2017). *Report of Transboundary Bypass Flows into the Tijuana River.*
3) IBWC (undated) *CILA Pump Station Operations and Notification Protocol*

Data:

1) Daily and/or monthly transboundary Tijuana River flows measured at the USIBWC streamgage just downstream of the U.S. – Mexico border
2) Daily and/or monthly Tijuana River flows measured at the PB-CILA facility
3) Daily and/or monthly precipitation in the Tijuana River Basin
4) Dates of San Diego County beach closures
5) Dates of known PB-CILA operational failures and causes (e.g. mechanical, accidental, planned outage, operator decisions, etc.)
6) Magnitude and frequency of undocumented operational failures based on questionnaire responses

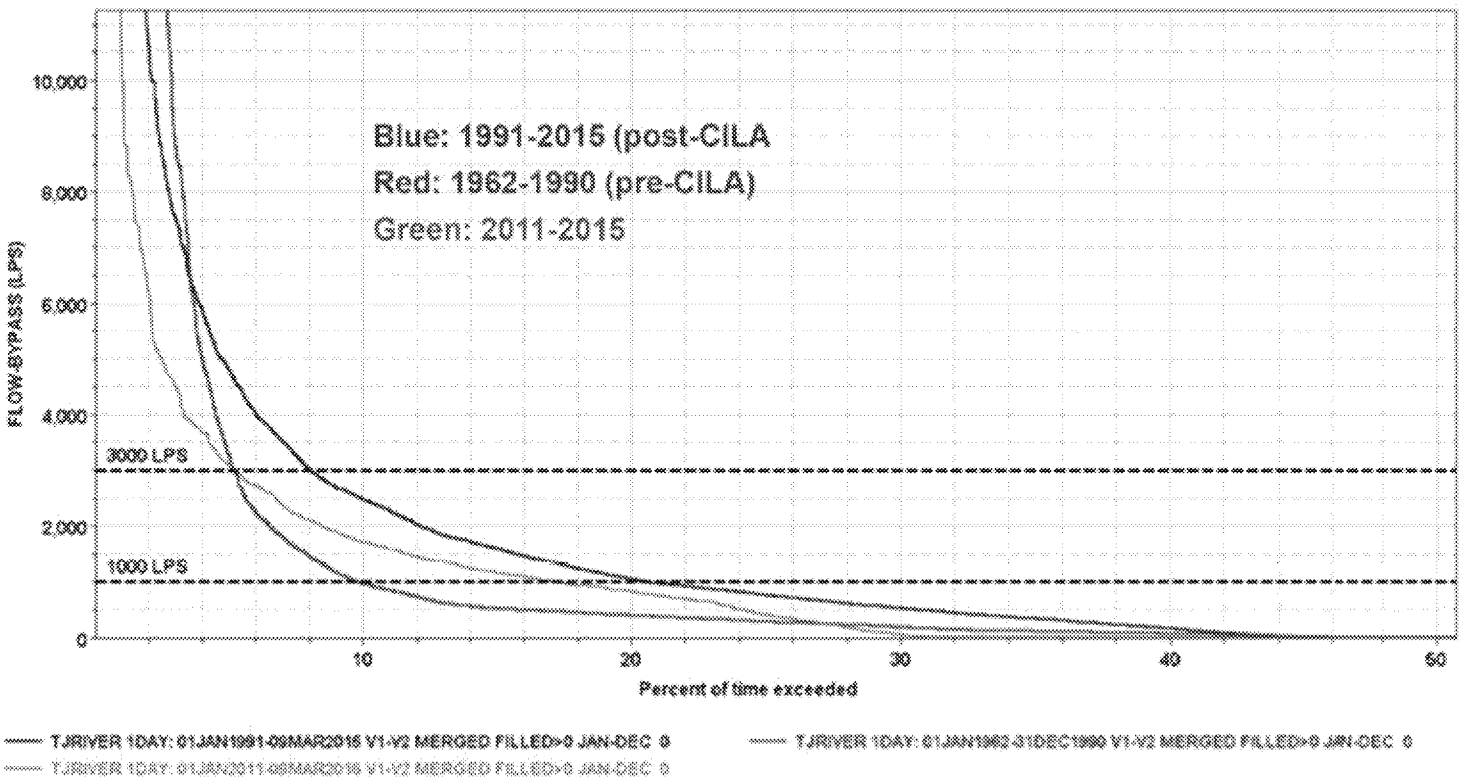
Task 1 – Transboundary flow statistics

Daily flow at USIBWC Gage, Tijuana River (1962-2016)



Task 1 – Transboundary flow statistics

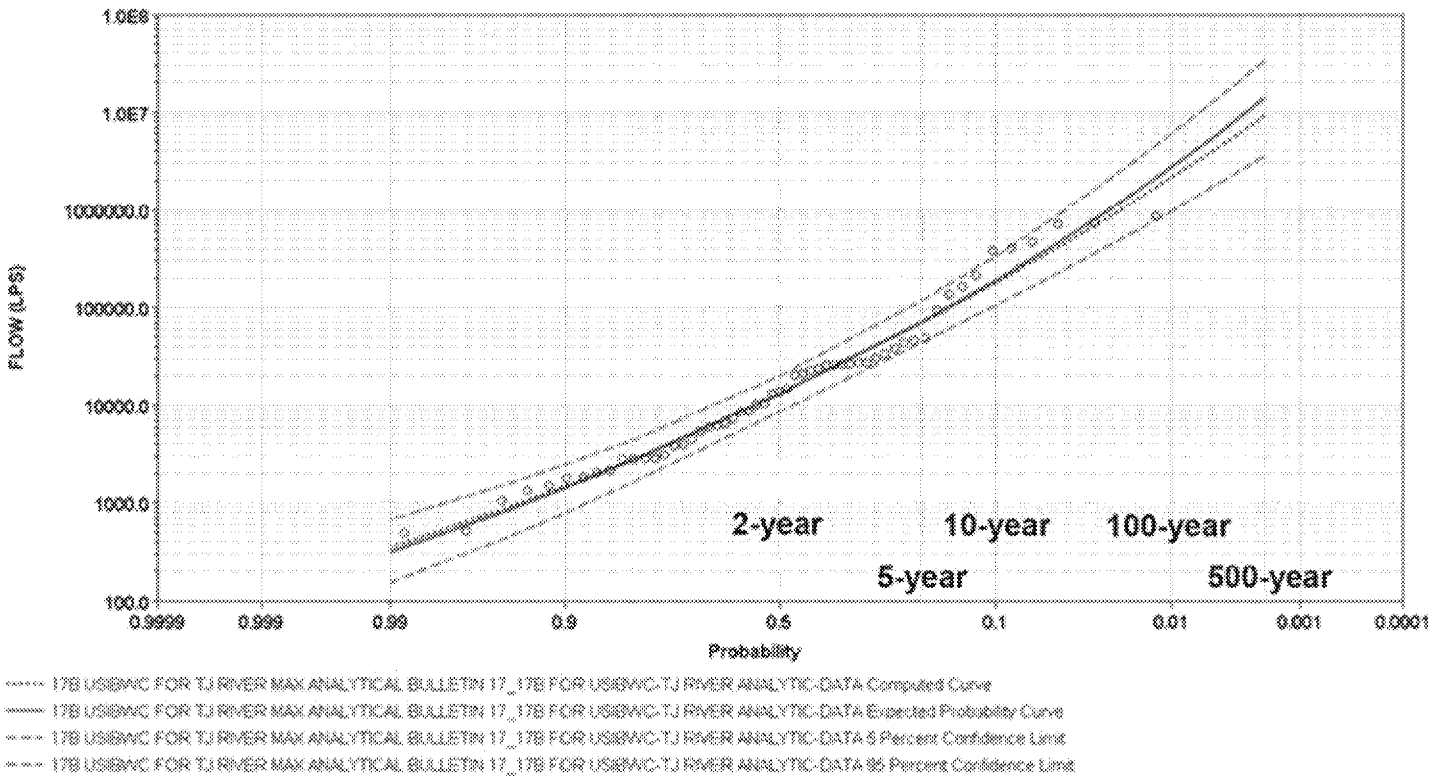
Daily flow duration at USIBWC Gage, Tijuana River



1) Average annual transboundary flow volume could be reduced about 80% with dependable capacity increase of an additional 1,000-lps.
2) Marginal effectiveness of increased diversion capacity diminishes beyond 3,000 lps.

Task 1 – Transboundary flow statistics

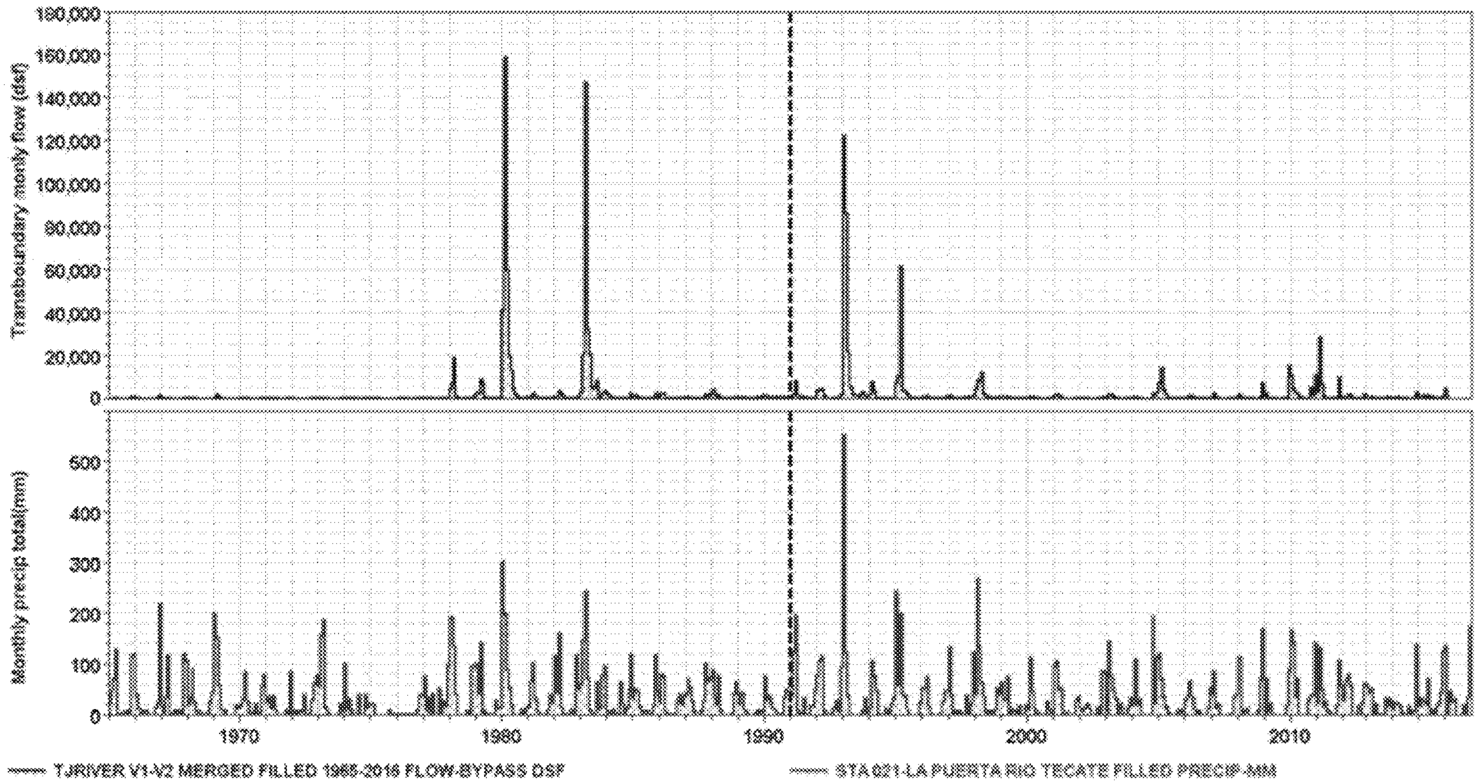
Flow frequency at USIBWC Gage, Tijuana River (1962-2016)



1) **Existing PB-CILA diversion capacity (1,200 lps) is equivalent to ~ 1-year flood**
2) **Increasing diversion capacity to handle stormwater from minor floods appears to be impractical (e.g. 10,000-lps dependable treatment capacity needed to divert/treat 2-year flood)**

Task 1 – Transboundary flow statistics

Monthly transboundary flow volume and cumulative precipitation at La Puerta Rio Tecate station, Mexico (1991-2016)



One-way ANOVA: Are pre- and post-CILA transboundary flow volumes statistically different?

1) Pre-CILA (1965-1990)
2) Post-CILA (1991-2016)
3) Conclusion: Post-CILA monthly TBFs average 45 lps (~2.2%) > Pre-CILA monthly TBFs

One-way ANOVA: Are pre- and post-CILA monthly precipitation depths statistically different?

1) Pre-CILA (1965-1990)
2) Post-CILA (1991-2016)
3) Conclusion: Post-CILA monthly precipitation averages 2mm (~6.6%) > Pre-CILA monthly precipitation

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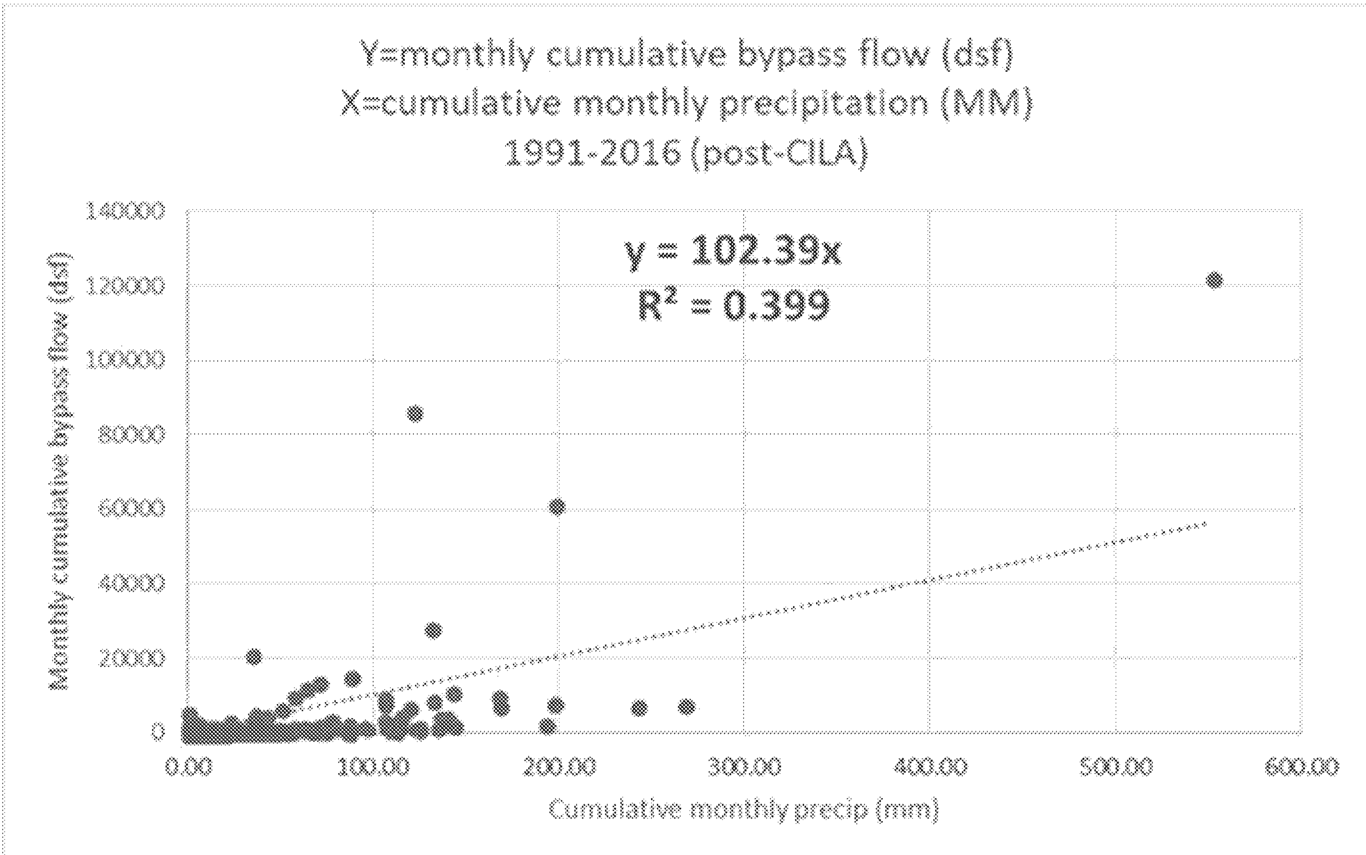
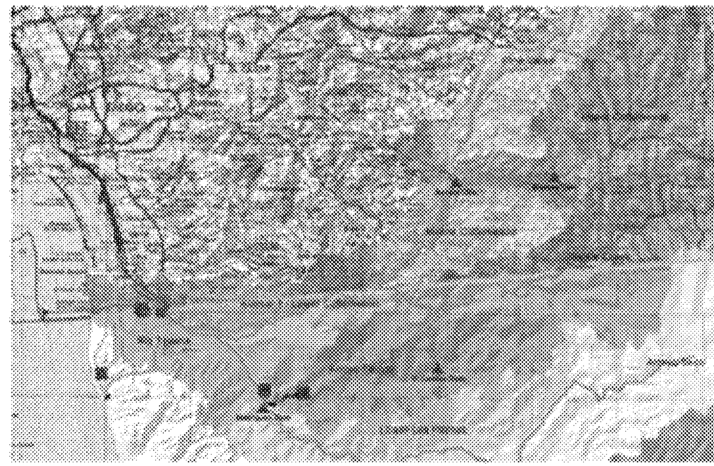
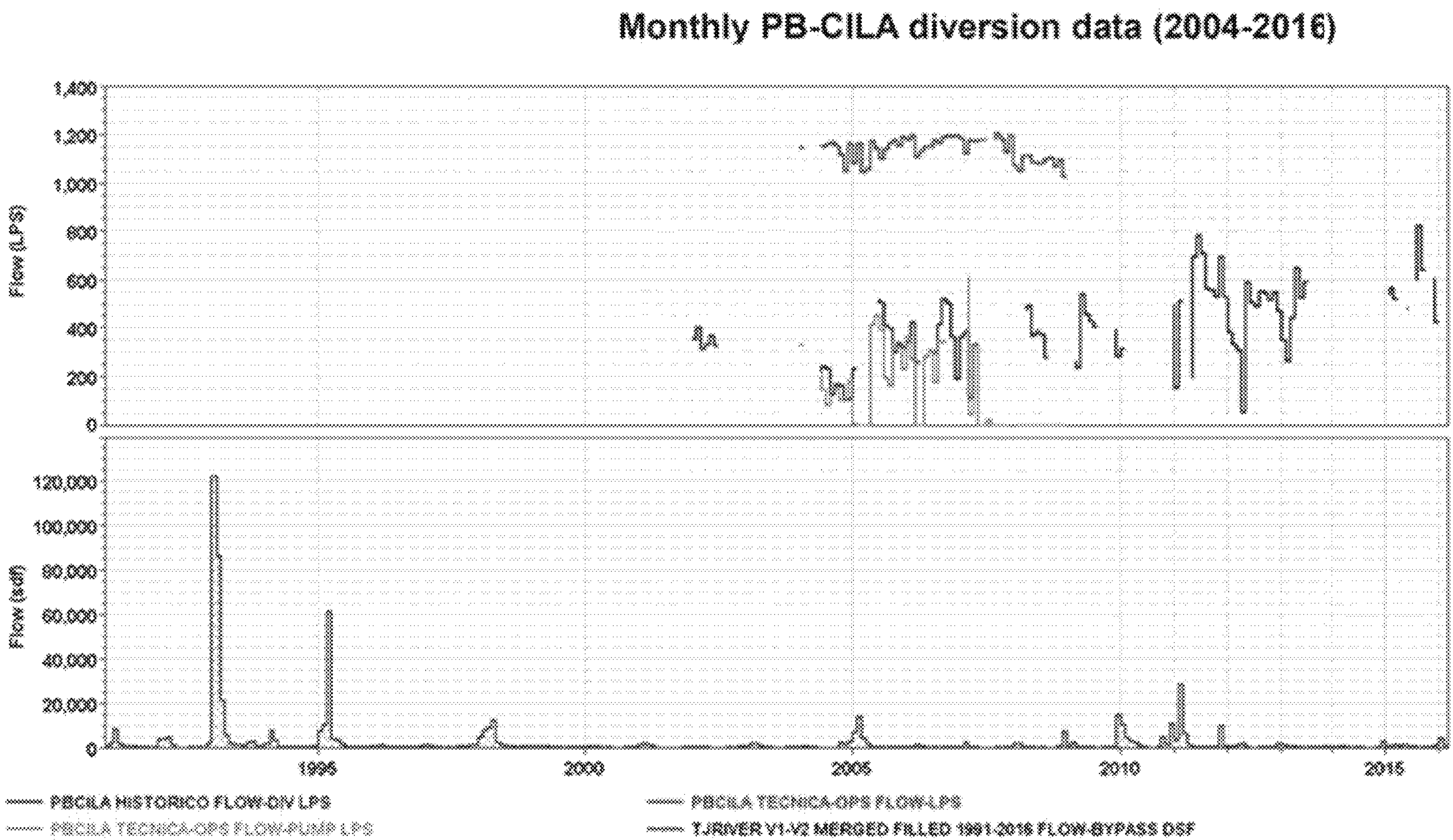
Task 1 – Transboundary flow statistics

Monthly transboundary flow volume and cumulative precipitation regression (1991-2016)





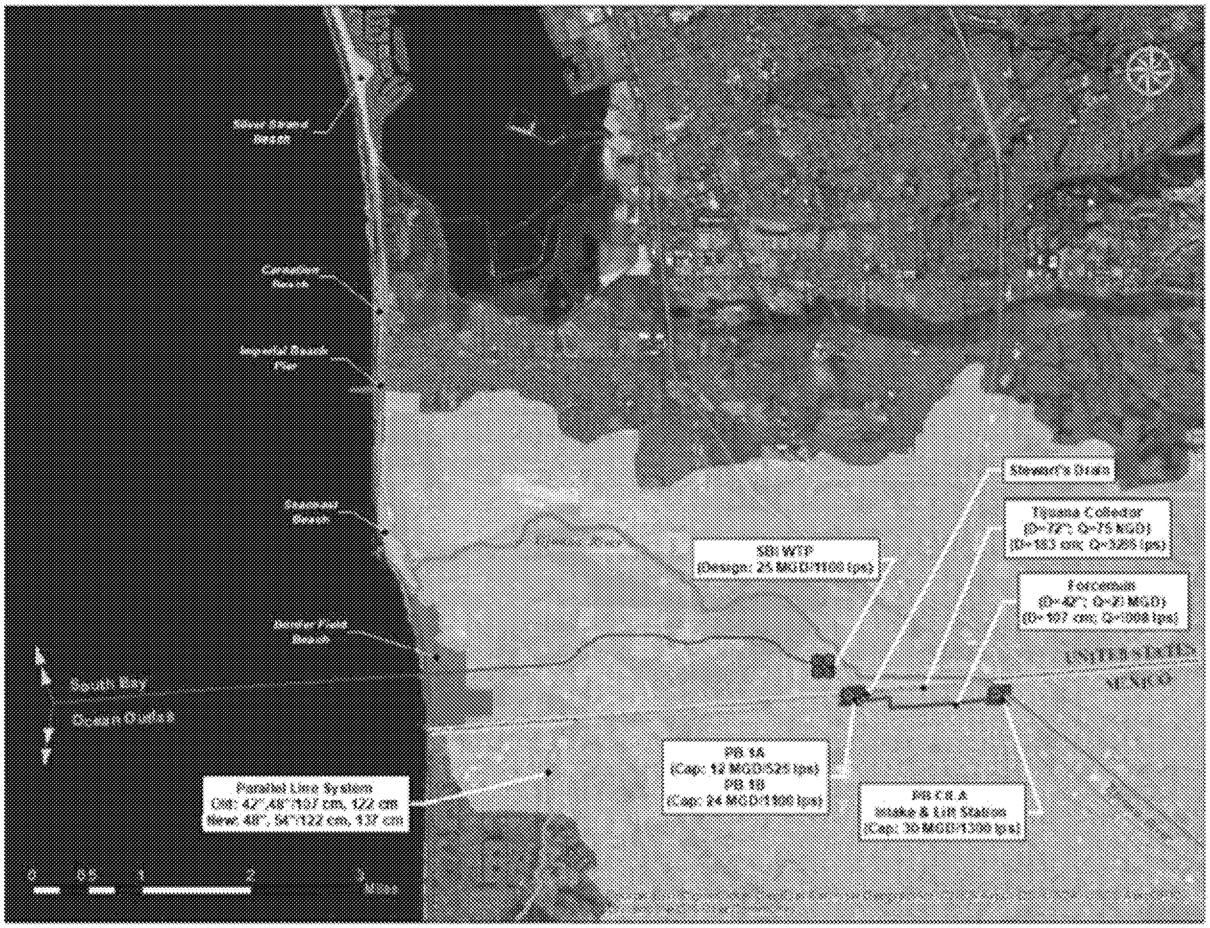
Task 1 – PB-CILA operational data



1) Indicates that PB-CILA operated at or near full capacity for much of 2005-2009
2) Have just received monthly residual flow (pumping) data for PB-CILA from 1999-2016.
3) Have just received monthly outage days for PB-CILA residual flow (pumping) from 2000-2013

Task 1 – Beach closures

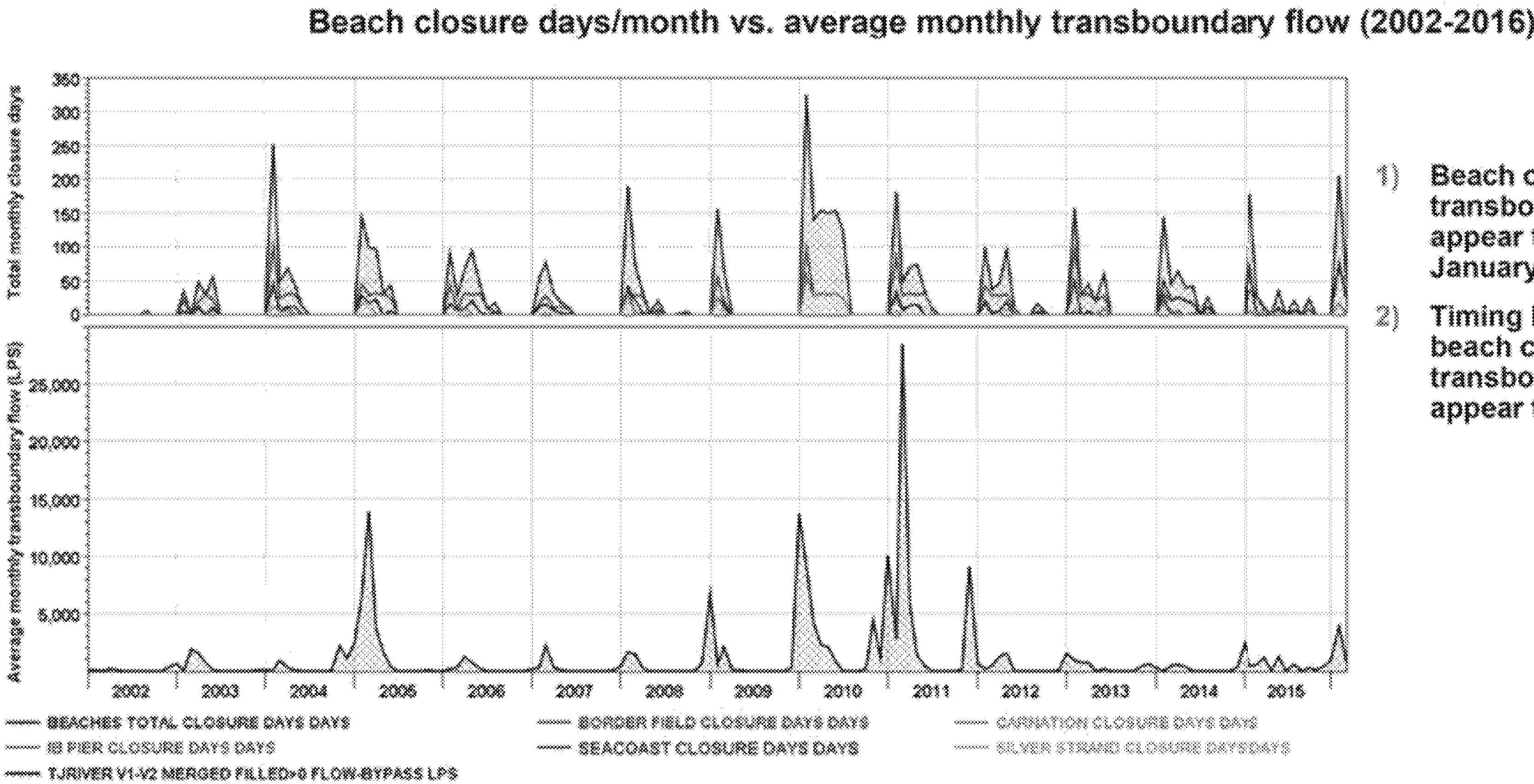
South San Diego beaches subject to closure



Closure days totaled monthly for:

1) Silver Strand Beach
2) Carnation Avenue Beach
3) Imperial Beach Pier
4) Seacoast Beach
5) Border Field Beach
6) Sum (1) – (5)

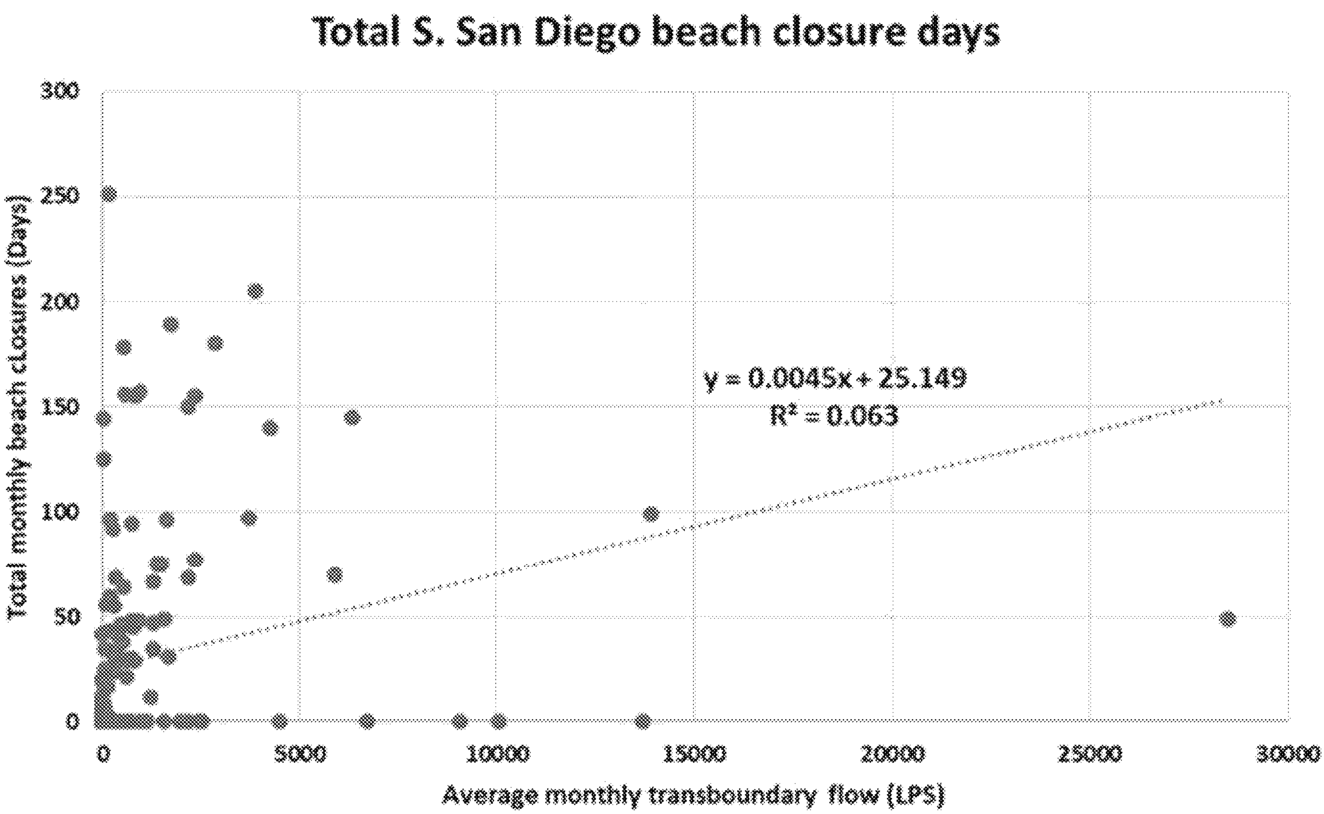
Task 1 – Beach closures



1) Beach closures and transboundary flow events appear to be seasonal (i.e. from January-June) in most years.
2) Timing but not magnitude of beach closure and transboundary flow volumes appear to be related.

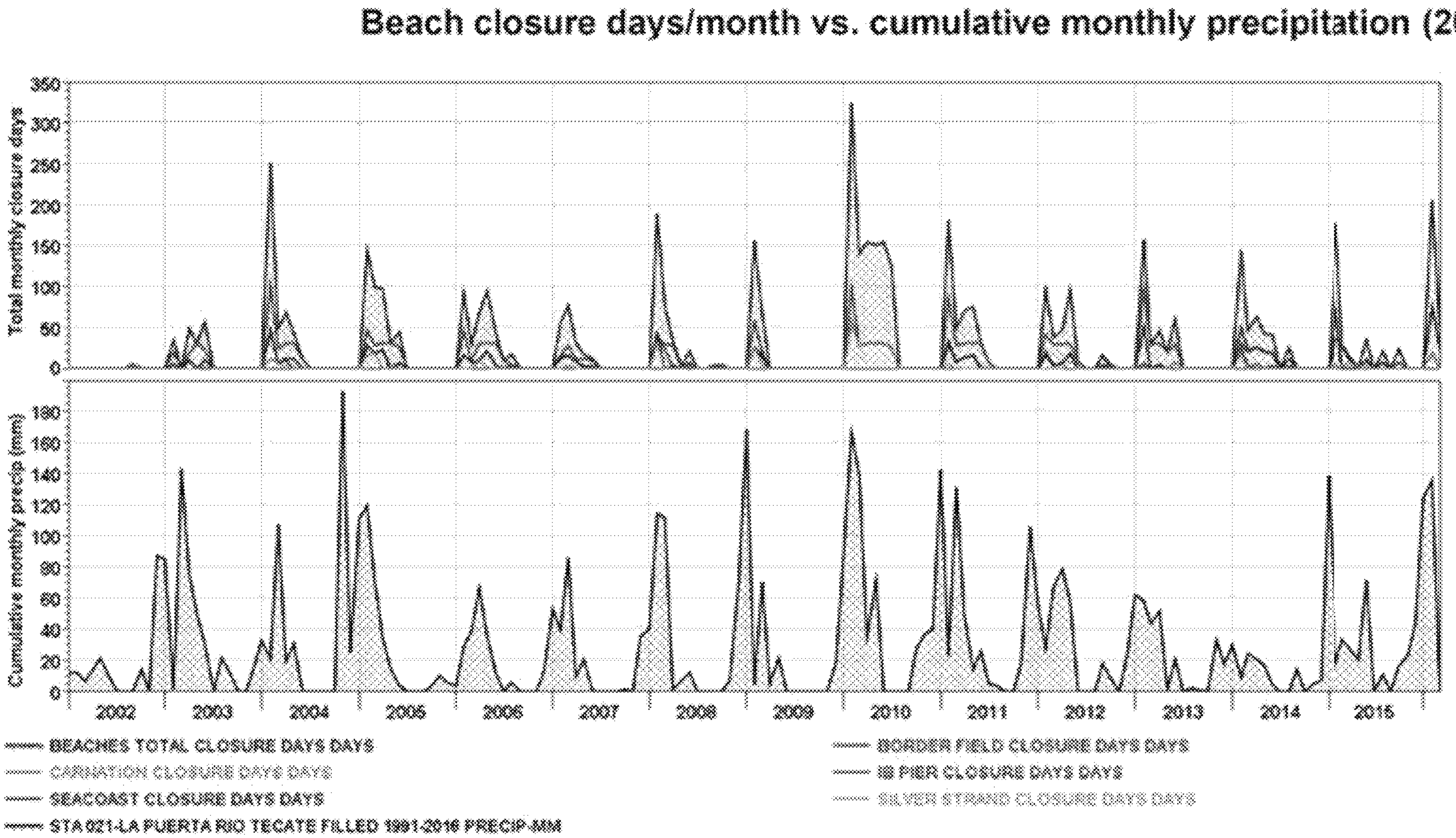
Task 1 – Beach closures

Beach closure days/month vs. average monthly transboundary flow (2002-2016)



1) **Weak correlation indicates that factors other than transboundary flows are likely to be more significant determinants of beach closures.**

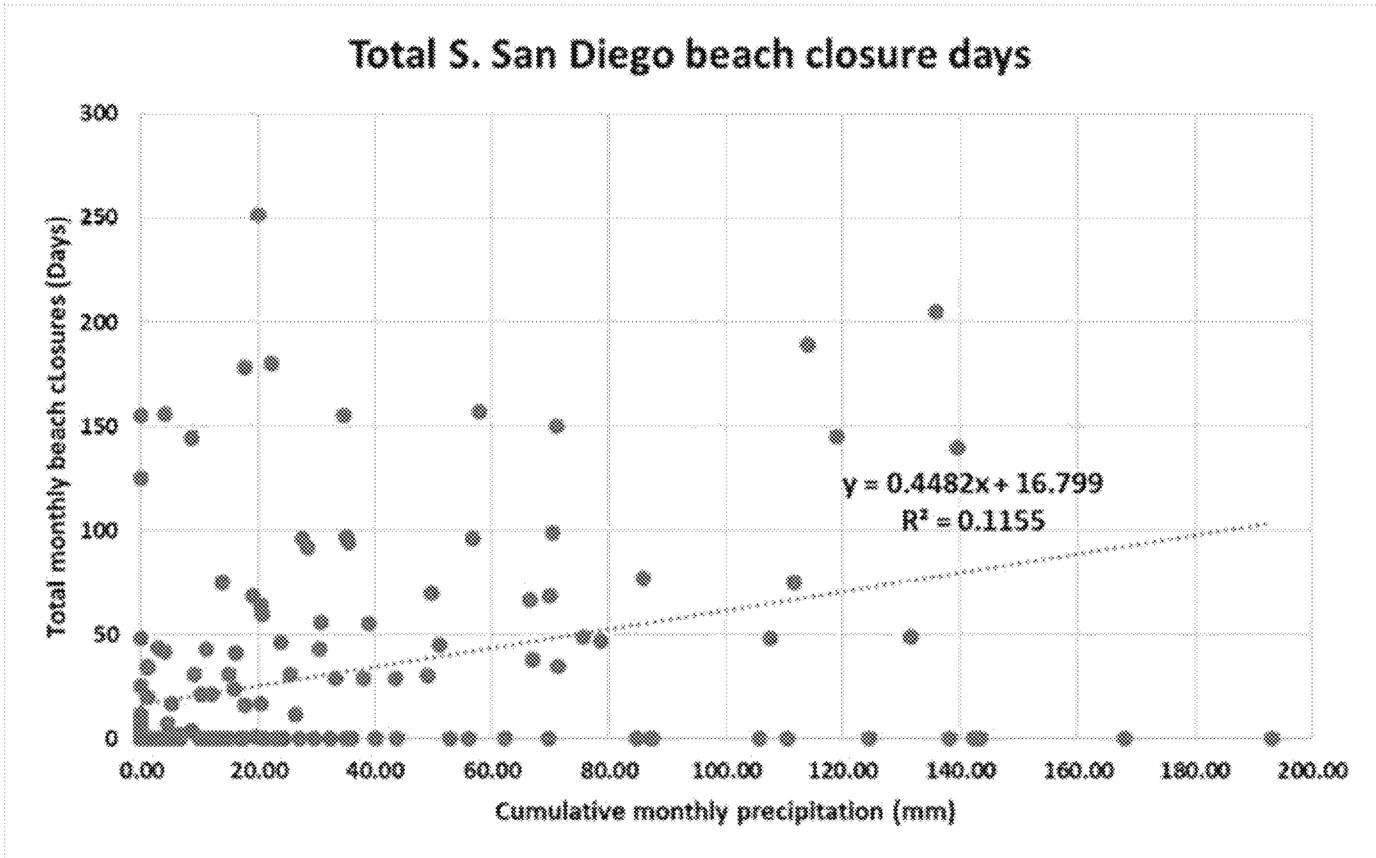
Task 1 – Beach closures



1) Beach closure days appear to increase in wet periods.
2) Number of beach closure days appears to be slightly better correlated with precipitation than with transboundary flow events.

Task 1 – Beach closures

Beach closure days/month vs. cumulative monthly precipitation (2002-2016)



1) Correlation coefficient about 2x that for transboundary flows.
2) Results indicate that precipitation may be a stronger determinant of beach closures than transboundary flows.
3) Stormwater may be more detrimental to beach use than dry-weather transboundary flows.

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Task 1 – Summary of findings

1) Average annual transboundary flow volume could be reduced by 80% with dependable diversion capacity increase of 1,000-lps.
2) Marginal effectiveness of increased diversion capacity diminishes beyond 3,000 lps.
3) Existing PB-CILA diversion capacity (1,300 lps) is equivalent to ~ 1-year flood.
4) Increasing diversion capacity to handle stormwater from minor floods appears to be impractical (e.g. 10,000-lps dependable treatment capacity needed to divert/treat 2-year flood).
5) Average monthly transboundary flows increased by 45 lps (~2.2%) since 1991 when PB-CILA was placed into operation; however, monthly precipitation also increased by 2 mm (~6.6%) from 1991-2016 in comparison to 1965-1990.
6) PB-CILA operational data available at time of analysis indicates that the plant operated at or near full capacity (1,300 lps) for much of 2005-2009. Monthly residual flow (pumping) data for PB-CILA from 1999-2016 and outages by month from 2000-2013 have just been made available but not yet analyzed.
7) Beach closures and transboundary flow events appear to be seasonal (i.e. from January-June) in most years. Beach closure and transboundary flow volumes appear to happen concurrently. Volume of transboundary flows has a weak correlation to beach closure days, implying that factors other than transboundary flows at the Tijuana River are likely to be more significant determinants of beach closures.
8) Beach closure days appear to increase in wet periods; stormwater runoff may be more detrimental to beach use than Tijuana River transboundary flows during dry weather.

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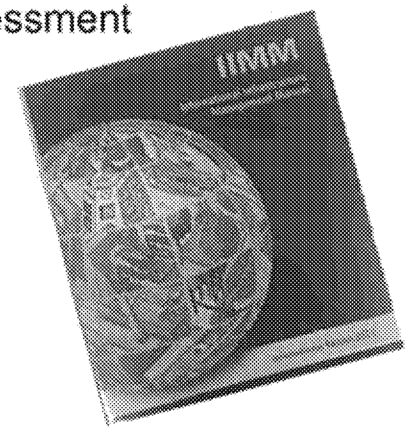
Task 2 – Infrastructure and Operations Diagnostic

- ✓ Review of Historical and Maintenance Data.

For Lift Station/WWTP diagnostics, our assessors established condition scores using a 1 to 5 scoring system.

- ✓ *For buried infrastructure diagnostics*, our assessors worked with key stakeholders to collect asset information and/or identify assets in need of additional condition assessment technologies.



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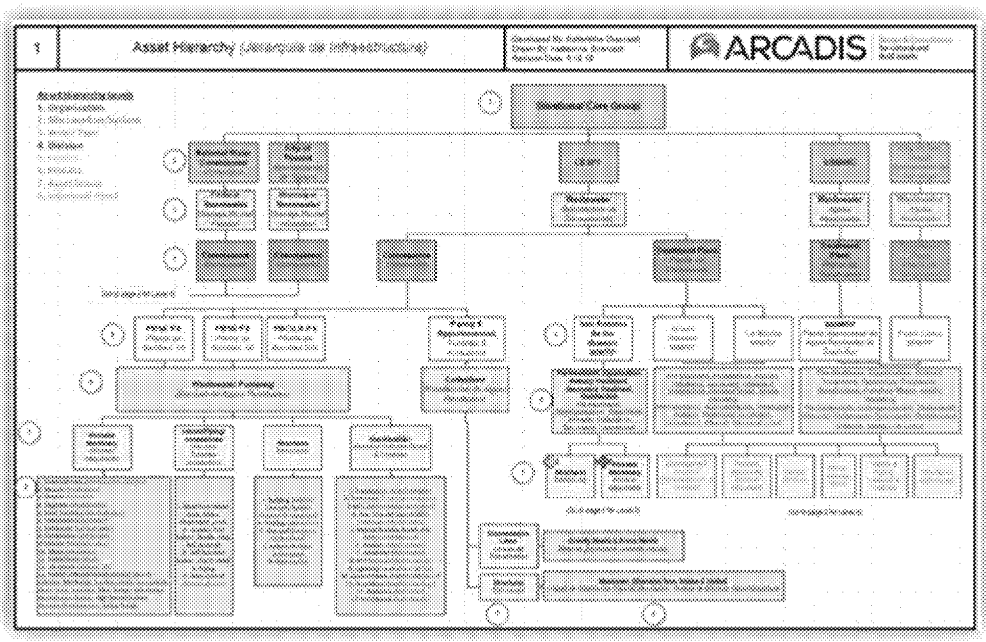
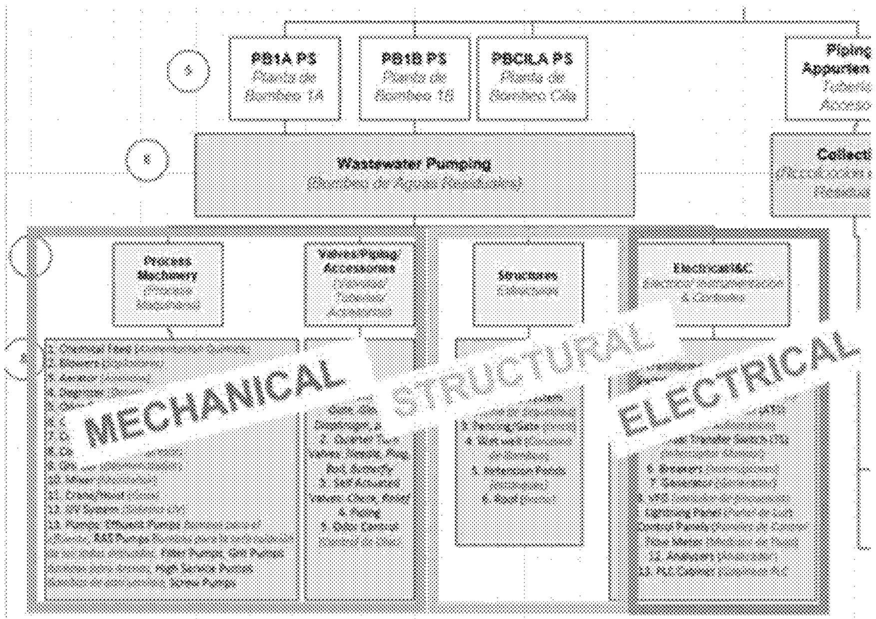
Task 2 – Infrastructure and Operations Diagnostic

Asset Hierarchy, Visual Diagnostic Criteria, and Technology Tools



Task 2 – Infrastructure and Operations Diagnostic

Physical Condition Approach



Mechanical Asset Hierarchy							
1. Organization	2. Site Location	3. Water Type	4. Division	5. Facility	6. Process	7. Asset Group	8. Individual Asset
Binational Core Group	MX Site	Wastewa	Conveyance	PB Cila	Wastewater Pumping	Pumps	Pump 1
Binational Core Group	MX Site	Wastewa	Conveyance	PB Cila	Wastewater Pumping	Pumps	Pump 2
Binational Core Group	MX Site	Wastewa	Conveyance	PB Cila	Wastewater Pumping	Pumps	Pump 3
Binational Core Group	MX Site	Wastewa	Conveyance	PB Cila	Wastewater Pumping	Pumps	Pump 4
Binational Core Group	MX Site	Wastewa	Conveyance	PB Cila	Wastewater Pumping	Pumps	Pump 5
Binational Core Group	MX Site	Wastewa	Conveyance	PB Cila	Wastewater Pumping	Pumps	Pump 6
Binational Core Group	MX Site	Wastewa	Conveyance	PB Cila	Wastewater Pumping	Pumps	Pump 7
Binational Core Group	MX Site	Wastewa	Conveyance	PB Cila	Wastewater Pumping	Pumps	Pump 8
Binational Core Group	MX Site	Wastewa	Conveyance	PB Cila	Wastewater Pumping	Pumps	Pump 9
Binational Core Group	MX Site	Wastewa	Conveyance	PB Cila	Wastewater Pumping	Pumps	Pump 10

Physical Diagnostic						
Field Code	Corrosion	Leakage	Vibration /Noise	Concrete Supports	Steel Supports	Electrical Connections
field_code	c1	c2	c3	c4	c5	c6
Condition Assessed	2	4	4	2	3	3
Condition Assessed	NS	NS	NS	2	3	3
Condition Assessed	NS	NS	NS	2	4	4
Condition Assessed	NS	NS	NS	3	2	NS
Condition Assessed	3	5	NS	3	3	2
Condition Assessed	3	5	NS	3	3	3
Condition Assessed	NS	NS	NS	1	1	1
Condition Assessed	NS	NS	NS	1	1	1
Condition Assessed	NS	NS	NS	1	1	1
Condition Assessed	NS	NS	NS	1	1	1